Express Mail Label No. EL521607483US 8-31-00 A

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No. P5180 (R&O Ref.: 03226.050001)
Total Pages in this Submission

08/30/00 JC914 U.S. PTO

09/651911 U.S. PTO 08/30/00

TO THE ASSISTANT COMMISSIONER FOR PATENTS
Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

IMPROVED METHOD AND APPARATUS FOR NETWORK PRINTING

and invented by:

Pankaj KHANDELWAL

If a CONTINUATION APPLICATION, *check appropriate box and supply the requisite information:*

☐ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: _____

Which is a:

☐ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: _____

Which is a:

☐ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: _____

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 12 pages and including the following:
   a. ☒ Descriptive Title of the Invention
   b. ☐ Cross References to Related Applications *(if applicable)*
   c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*
   d. ☐ Reference to Microfiche Appendix *(if applicable)*
   e. ☒ Background of the Invention
   f. ☒ Brief Summary of the Invention
   g. ☒ Brief Description of the Drawings *(if drawings filed)*
   h. ☒ Detailed Description
   i. ☒ Claim(s) as Classified Below
   j. ☒ Abstract of the Disclosure

22511
PATENT TRADEMARK OFFICE

UTILITY PATENT APPLICATION TRANSMITTAL
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Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*
   a. ☒ Formal Number of Sheets 5
   b. ☐ Informal Number of Sheets

4. ☒ Oath or Declaration
   a. ☒ Newly executed *(original or copy)* ☐ Unexecuted
   b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
   c. ☐ With Power of Attorney ☒ Without Power of Attorney
   d. ☐ *DELETION OF INVENTOR(S)*
   Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Computer Program in Microfiche *(Appendix)*

7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*
   a. ☐ Paper Copy
   b. ☐ Computer Readable Copy *(identical to computer copy)*
   c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☒ Assignment Papers *(cover sheet & document(s))*

9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*

10. ☐ English Translation Document *(if applicable)*

11. ☒ Information Disclosure Statement/PTO-1449 ☒ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Acknowledgment postcard

14. ☒ Certificate of Mailing
   ☐ First Class ☒ Express Mail *(Specify Label No.):* **EL521607483US**

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

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Docket No. P5180 (R&O Ref.: 03226.050001)
Total Pages in this Submission

Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

16. ☐ Additional Enclosures *(please identify below):*

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra		Rate	Fee
Total Claims	16	- 20 =	0	x	$18.00	$0.00
Indep. Claims	5	- 3 =	2	x	$78.00	$156.00
Multiple Dependent Claims (check if applicable) ☐						$0.00
					BASIC FEE	$690.00
OTHER FEE *(specify purpose)*			**ASSIGNMENT**			$40.00
					TOTAL FILING FEE	$886.00

☒ A check in the amount of **$886.00** to cover the filing fee is enclosed.

☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **50-0591** as described below. A duplicate copy of this sheet is enclosed.

- ☐ Charge the amount of as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Signature

Dated: **August 30, 2000**

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CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10) Applicant(s): **Pankaj KHANDELWAL**	Docket No. **P5180 (R&O Ref.: 03226.050001)**

Serial No.	Filing Date	Examiner	Group Art Unit
	August 30, 2000		

Invention: **IMPROVED METHOD AND APPARATUS FOR NETWORK PRINTING**

I hereby certify that the following correspondence:

UTILITY APPLICATION

(Identify type of correspondence)

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to: The Assistant Commissioner for Patents, Washington, D.C. 20231 on

August 30, 2000
(Date)

Dawn-Marie Vogel
(Typed or Printed Name of Person Mailing Correspondence)

(Signature of Person Mailing Correspondence)

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("Express Mail" Mailing Label Number)

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EL521607483US

PATENT
ATTORNEY DOCKET NO.: P5180/03226.050001

APPLICATION

FOR

UNITED STATES LETTERS PATENT

TITLE: **IMPROVED METHOD AND APPARATUS FOR NETWORK PRINTING**

APPLICANT: **Pankaj KHANDELWAL**

"EXPRESS MAIL" Mailing Label Number: EL521607483US
Date of Deposit: August 30, 2000

22511

PATENT TRADEMARK OFFICE

IMPROVED METHOD AND APPARATUS FOR NETWORK PRINTING

BACKGROUND OF THE INVENTION

When a printer receives a print job from a networked computer, a printer controller associated with the printer typically processes the incoming print job as a special type of file known as PostScript. The controller then decodes the file and outputs the print job to the printer. PostScript is a device-independent page description language developed by Adobe Systems Incorporated. Because the language is device independent, an image may be described without reference to any specific device features (*e.g.* printer resolution) so that the same description can be used on any printer capable of reading PostScript files.

If the printer does not identify a print job as being a PostScript file, the printer typically will assume that the print job is an ASCII file and will print the ASCII equivalent of the characters from the print job. If the file is not an ASCII file, however, this assumption results in pages of unrecognizable symbols and phrases being printed. Special file formats (*e.g.*, files with extensions such as .gif and .jpg) must, therefore, contain programming to convert such files into PostScript language so that such files can be properly printed.

When a file is sent to the printer (a print job), the print job typically contains a header that includes a description of the format. However, when a user submits a specific type of command, such as a line print command (in UNIX, for example, the commands lp or lpr) the header may not be included, and printing errors may result. The print job may not contain a specific separate sections to describe the file format, but somewhere within the file itself is a description of the file format. Throughout this application, when the term "header" is used, it should

be recognized that the term is used to relate to any information regarding file format.

In such networked systems, each personal computer does not need its own dedicated printer, thus reducing the system cost. A print server receives print jobs from a plurality of networked computers and coordinates the distribution of the print jobs to a number of printers. A typical network printing system is shown in FIG. 1. The network printing system includes a printer **2** as a printing device for outputting an image to paper. A network interface controller **3** is provided to connect the printer **2** to a network **4**. The network **4** may be either a local (LAN) or a wide (WAN) area network. A printer controller **5** converts a received print job from the network interface controller **3** to printable image data and outputs the converted print job to the printer **2**. A plurality of workstations **1**, often referred to as "client machines", each connected to the network **4**, and a printer server **7** are also included. The printer server **7** connects the printer **2** and printer controller **5** to the plurality of workstations **1** through the network **4** and the network interface controller **3**. In this configuration, the network printing system uses the printer **2** as a shared network resource for use by each of the plurality of workstations **1.**

When a user of one of the workstations **1** wants to print a document, the user specifies a document to be printed, sets the appropriate printing conditions (*e.g.,* orientation, number of pages) and instructs the workstation **1** to generate a print job. When the print job is transferred to the printer server **7** through the network **4**, the print job is placed in a queue by a print queue function of the printer server **7**. The printer server **7** typically queues the print jobs based on the order in which they were received. The printer server **7** then transfers the print job

that is in the first queue position to the printer controller **5** through the network **4** and network interface controller **3**. The printer controller **5** converts the print job to printable image data, outputs the data to the printer **2** and controls the printer **2**. The result is typically the formation of an image or document text on paper.

SUMMARY OF THE INVENTION

One aspect of the invention relates to an apparatus for improved network printing including a plurality of client machines connected by a network, a printer connected to the network by a network interface controller, a printer server connected to the printer, a printer controller connected to the printer, and a header analyzer embedded into a memory of the printer controller.

In one aspect, the invention relates to a method for improved networked printing that includes monitoring and repairing incoming print jobs in a header analyzer embedded in the printer controller, and outputting the repaired print jobs to a printer in a header analyzer.

In one aspect, the invention relates to an apparatus for improved networked printing that includes a plurality of client machines connected by a network, a printer connected to the network by a network interface controller, a printer server connected to the printer, a printer controller connected to the printer, and a filter embedded into a memory of each of the plurality of client machines.

In one aspect, the invention relates to a method for improved network printing that includes filtering a print job prepared by each of the plurality of client machines in a filter embedded in the plurality of client machines, and printing each print job on a printer.

In one aspect, the invention relates to an apparatus for improved network printing that includes a plurality of client machines connected by a network, a printer connected to the network by a network interface controller, a printer server connected to the printer, a printer controller connected to the printer, and filter embedded in the memory of a networked component.

Other aspects and advantages of the invention will be apparent from the following description and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a prior art networked printer system.

FIG. 2 is a schematic diagram in accordance with one embodiment of the present invention.

FIG. 3 is a flow chart illustrating a method in accordance with one embodiment of the present invention.

FIG. 4 is a schematic diagram in accordance with one embodiment of the present invention.

FIG. 5 is a flow chart illustrating a method in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Computer users would like to avoid printing errors and ASCII default printing because such errors waste paper and time. The present invention allows a user to reduce these types of errors in printing.

In FIG. 2, a plurality of client machines **1** are connected to a networked

printer **2**. A suitable client machine can be any networked computer system. For example, a plurality of networked workstations (*i.e.*, computers lacking individual CPU's), or a plurality of networked PC's. A network interface controller **3** connects the printer **2** to a network **4** through a printer controller **5**, which converts data sent from the network interface controller **3** to printable image data and outputs the converted print data to the printer **2**. A header analyzer **6** located in a memory of the printer controller **5** checks and fixes errors associated with the header of a print job. Once again, the term header is used to describe any information relating to the description of the file format. Not all print jobs will have specific headers, but all jobs will have information about the file format. The header analyzer **6** reviews the incoming print job and determines whether the incoming print job is a PostScript print job. If the print job is improperly formated, or is missing header information, the header analyzer **6** fixes the print job and outputs the fixed print job to the printer. Missing information may include, for example, any color information required for printing a color document. The header analyzer **6** may be incorporated into a resident memory on the printer controller **5**.

In this embodiment, if a user at one of the plurality of client machines **1** wishes to print a document, the user enters a line print command and generates a print job. The print job is transferred to the printer server **7** through the network **4**, and the print job is placed in a queue by a print queue function of the printer server **7**. The printer server **7** then transfers the print job that is first in queue to the printer controller **5** through the network **4** and network interface controller **3**. The header analyzer **6** checks and fixes the print job. The printer controller **5** then

converts the fixed print job to printable image data, and outputs the fixed print job to the printer **2.** The printer **2** then produces an image on paper. FIG. 3 illustrates a logical pathway of the header analyzer **6**. In FIG. 3, a flow chart illustrates the logical steps of the header analyzer **6**. A print job enters into the header analyzer **6** where a header checked to see if all necessary information is present. If the information is not present, the header analyzer **6** can add the required information. The header analyzer **6** checks to see if all of the header information is correct. If it is not, the header analyzer **6** can either halt printing and inform a user, or it can fix the header info. The checked and fixed print job may then be sent to the print controller **5**. As an example, a file "photo.gif" is transmitted file a line print command to the header analyzer **6**, which recognizes that the file has a format other than PostScript. The header analyzer **6**, then either halts printing or converts the file.

Although the above has been described with reference to an exemplary embodiment, the description of the individual components is not intended to limit the scope of the invention. Different types of networks may be used, for example, rather than using the plurality of client machines **1** a networked system of PC's may be used. Other types of networks are possible as well such as an ethernet-based network. In larger systems, multiple printers may be used, rather than the single printer shown here. Other types of printers rather than PostScript printers may be used. Additionally, other components may be present in the system, such as networked scanners, copiers, etc.

FIG. 4 illustrates another embodiment in accordance with the invention. In FIG. 4, a filter **10** is embedded in a resident memory (not shown) of each of a

plurality of client machines **1**. The plurality of client machines **1** are networked to a printer **2** in a similar configuration to that described in the above embodiment. Also included are a network interface controller **3**, a printer controller **5**, and a printer server **7** connected by a network **4**. The filter **10** converts all non-ASCII outgoing print jobs into PostScript language in the proper format to ensure error free printing. The filter **10** operates by reviewing an outgoing stream of data and converting the stream into a print job in a PostScript format, if necessary. Because PostScript is a language, the filter **10** functions in a manner similar to a compiler (such as a compiler in Pascal or C++, for example). However, the filter **10** not only determines whether the outgoing stream of data is in proper format, but is able to "fix" any errors therein. This allows a properly formatted file to be sent to the printer **2**, as described above, which results in fewer printer errors. The above embodiment is referenced to a PostScript printer, but other types of printers may be used. FIG. 5 illustrates a logical overview of the filter **10**. In FIG. 5, the logical steps performed by the filter **10** are shown. The filter **10** scans an incoming print job and determines whether the print job is in the proper format. If the print job is not in the proper format, the filter **10** formats the print job and sends the formatted print job to the network **4**. In a typical example, a user wishes to print a file "photo.gif", and issues a print command. The file is then sent to the filter **10** which examines the file. If the filter **10** determines that the file has an extension other than PostScript (in this embodiment), the filter **10** opens a utility program, stores the file into the utility program, and then the utility program converts the file to the proper format. The file is then transmitted to the network, where it eventually is printed.

This invention supplies a low cost, easy to implement method and apparatus for reducing printing errors in network printing systems. This allows a reduction in wasted time as well as reducing waste paper.

Those skilled in the art will appreciate that other embodiments of the invention can be devised which do not depart from the spirit of the invention as disclosed herein. For example, the header analyzer **6** may be incorporated into the network interface controller **3**, the printer **2**, or the printer server **7** (*i.e.*, any networked component, other than the plurality of client machines **1**). Additionally, the invention should not be limited to PostScript printers. Any preselected file format may be used, regardless of type. Accordingly, the scope of the invention should be limited only by the attached claims.

CLAIMS

What is claimed is:

1. An apparatus for improved network printing comprising:
a plurality of client machines connected to a network;
a printer connected to the network by a network interface controller;
a printer server connected to the printer;
a printer controller connected to the network; and
a header analyzer embedded in a memory of the printer controller.

2. The apparatus of claim 1, wherein the network comprises a Local Area Network.

3. The apparatus of claim 1, wherein the network comprises a Wide Area Network.

4. The apparatus of claim 1, wherein the header analyzer is adapted to check for any errors preventing proper printing in a print job transferred from the network interface controller.

5. The apparatus of claim 1, wherein the header analyzer is adapted to fix any errors preventing proper printing in a print job transferred from the network interface controller.

6. A method of improved networked printing comprising:

monitoring and repairing incoming print jobs from a network interface controller connected to a network in a header analyzer embedded in a printer controller; and

outputting the repaired print jobs to a printer.

7. An apparatus for improved networked printing comprising:

a plurality of client machines connected to a network;

a printer connected to the network by a network interface controller;

a printer server connected to the network;

a printer controller connected to the printer; and

a filter embedded into a memory of at least one of the plurality of workstations.

8. The apparatus of claim 7, wherein the network comprises a Local Area Network.

9. The apparatus of claim 7, wherein the network comprises a Wide Area Network.

10. The apparatus of claim 7, wherein the filter is adapted to check for any errors preventing proper printing in a print job before the print job is outputted to the network.

11. The apparatus of claim 7, wherein the filter is adapted to fix any errors preventing proper printing in a print job before the print job is outputted to the network.

12. A method for improved network printing comprising:

filtering a print job prepared by each of the plurality of client machines in a filter embedded in the plurality of client machines; and

printing the print job on a printer.

13. An apparatus for improved network printing comprising:

a plurality of client machines connected by a network;

a printer connected to the network by a network interface controller;

a printer server connected to the printer;

a printer controller connected to the printer; and

a header analyzer embedded in the memory of a networked component.

14. The apparatus of claim 13, wherein the networked component comprises the printer.

15. The apparatus of claim 13, wherein the networked component comprises the printer server.

16. The apparatus of claim 13, wherein the networked component comprises the printer controller.

IMPROVED METHOD AND APPARATUS FOR NETWORK PRINTING

ABSTRACT

An apparatus is disclosed for improved network printing including a plurality of client machines connected by a network, a printer connected to the network by a network interface controller, a printer server connected to the printer, a printer controller connected to the printer, and a header analyzer embedded into a memory of the printer controller. A method is also disclosed of improved networked printing using a header analyzer in a networked component to monitor and repair incoming print jobs, and outputting the repaired print jobs to a printer. Also disclosed is an apparatus for improved networked printing that includes a plurality of client machines connected by a network, a printer connected to the network by a network interface controller, a printer server connected to the printer, a printer controller connected to the printer, and a filter embedded into a memory of each of the plurality of workstations. Additionally disclosed is a method for improved network printing that includes using a filter embedded in each of a plurality of client machines to filter a print job prepared by each of the plurality of client machines, and printing the print job on a printer.

FIG. 1
Prior Art

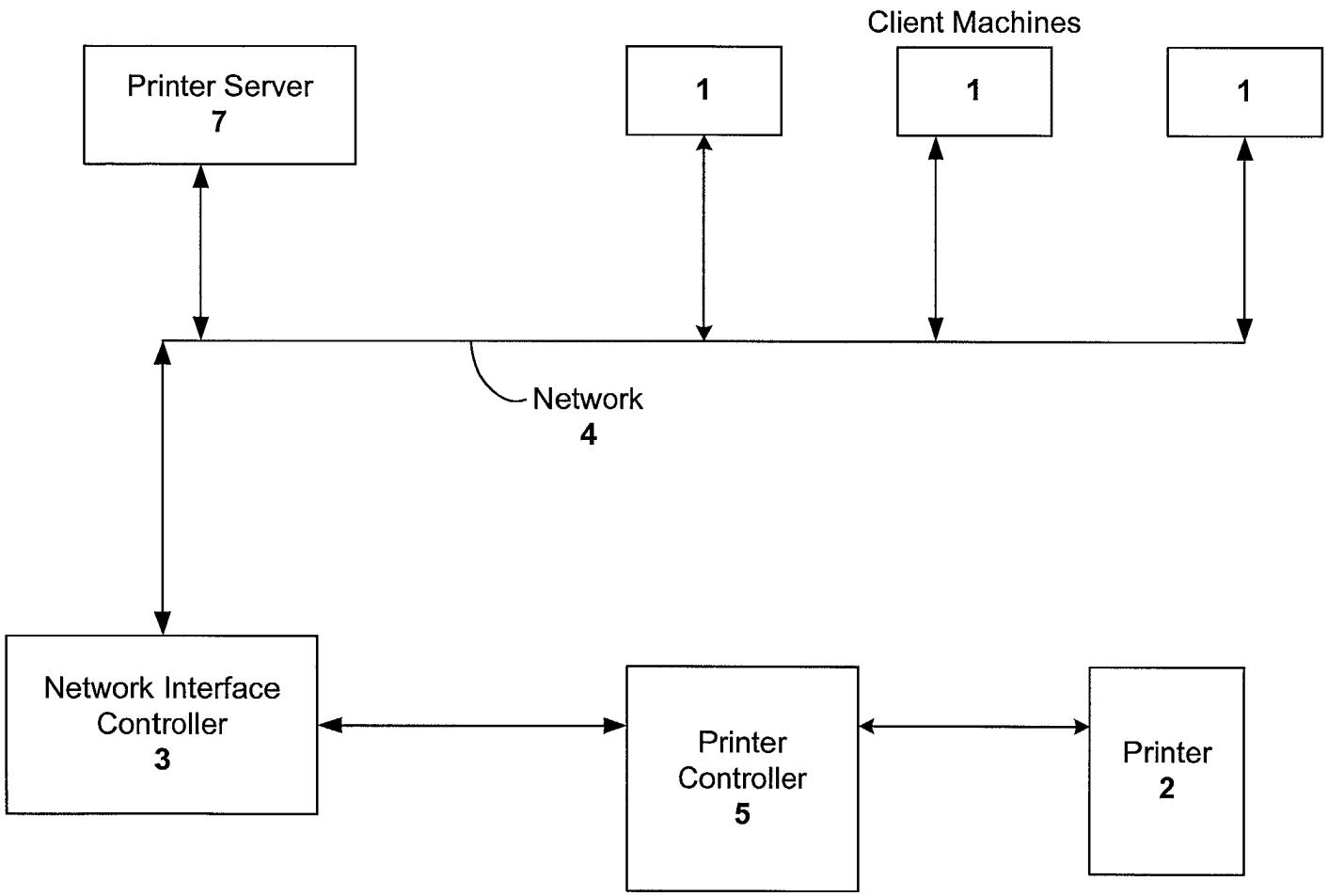


FIG. 2

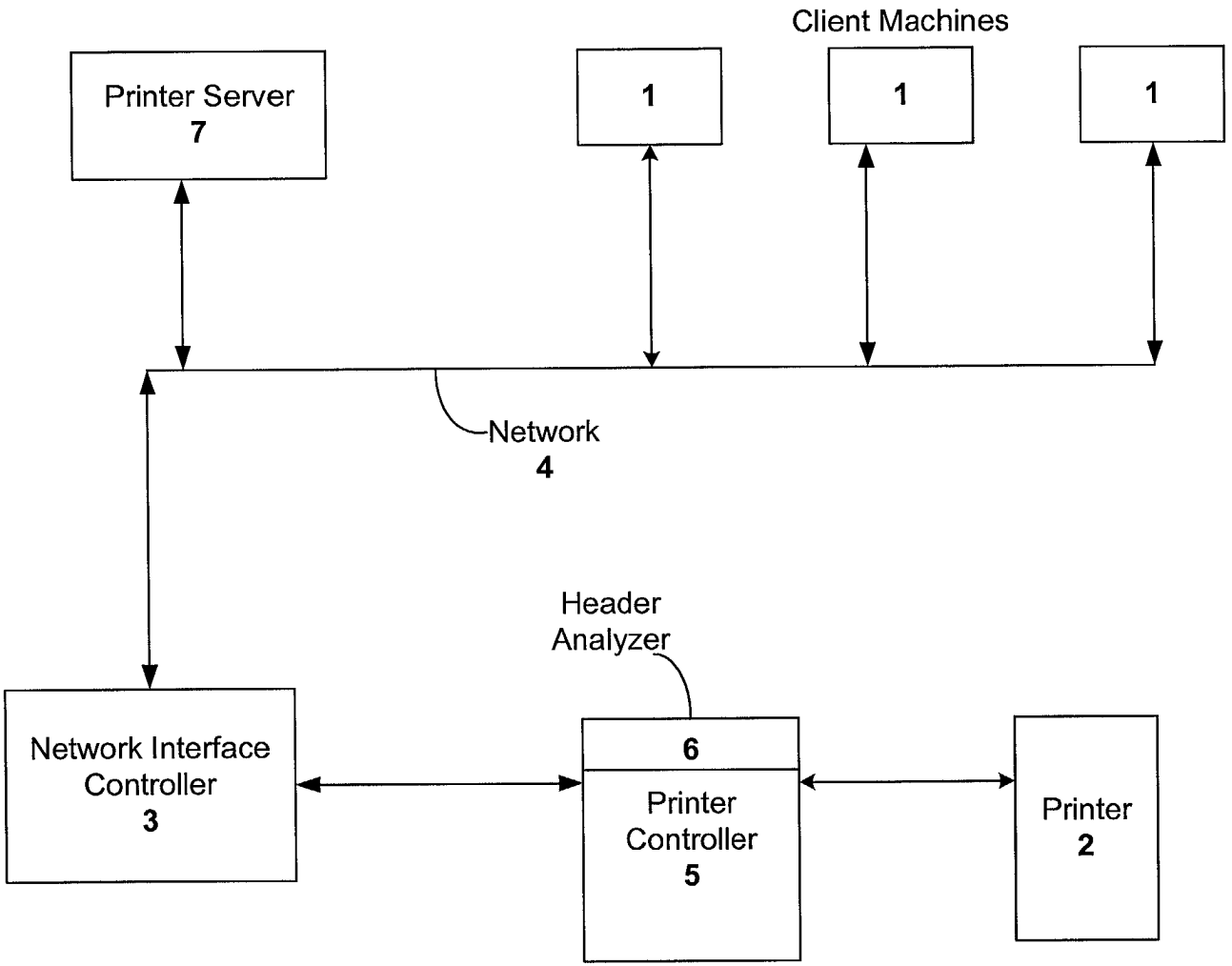

Client Machines
Printer Server
7
1
1
1
Network
4
Header
Analyzer
Network Interface
Controller
3
6
Printer
Controller
5
Printer
2

FIG. 3

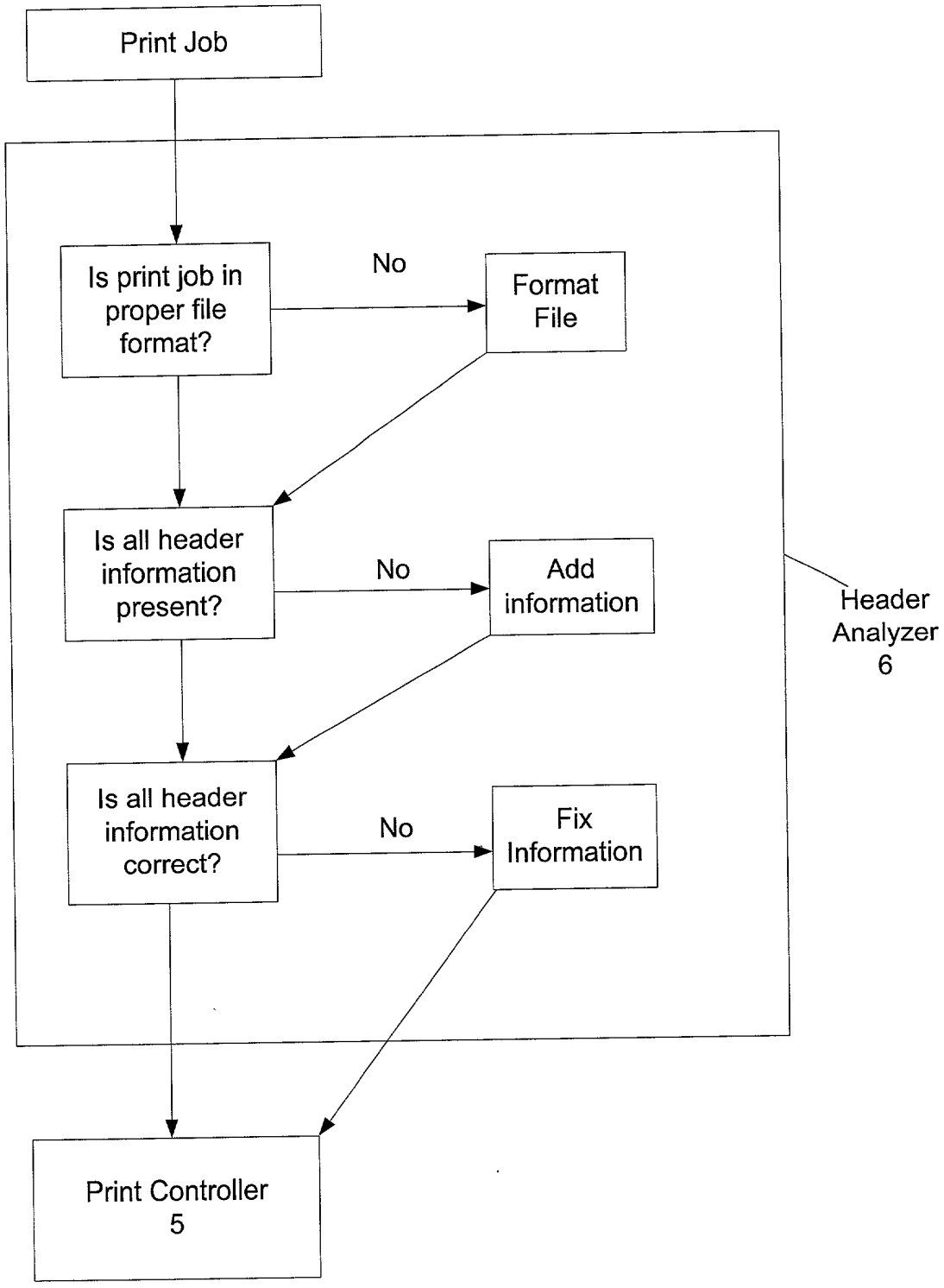

Print Job
Is print job in proper file format?
No
Format File
Is all header information present?
No
Add information
Is all header information correct?
No
Fix Information
Header Analyzer 6
Print Controller 5

FIG. 4

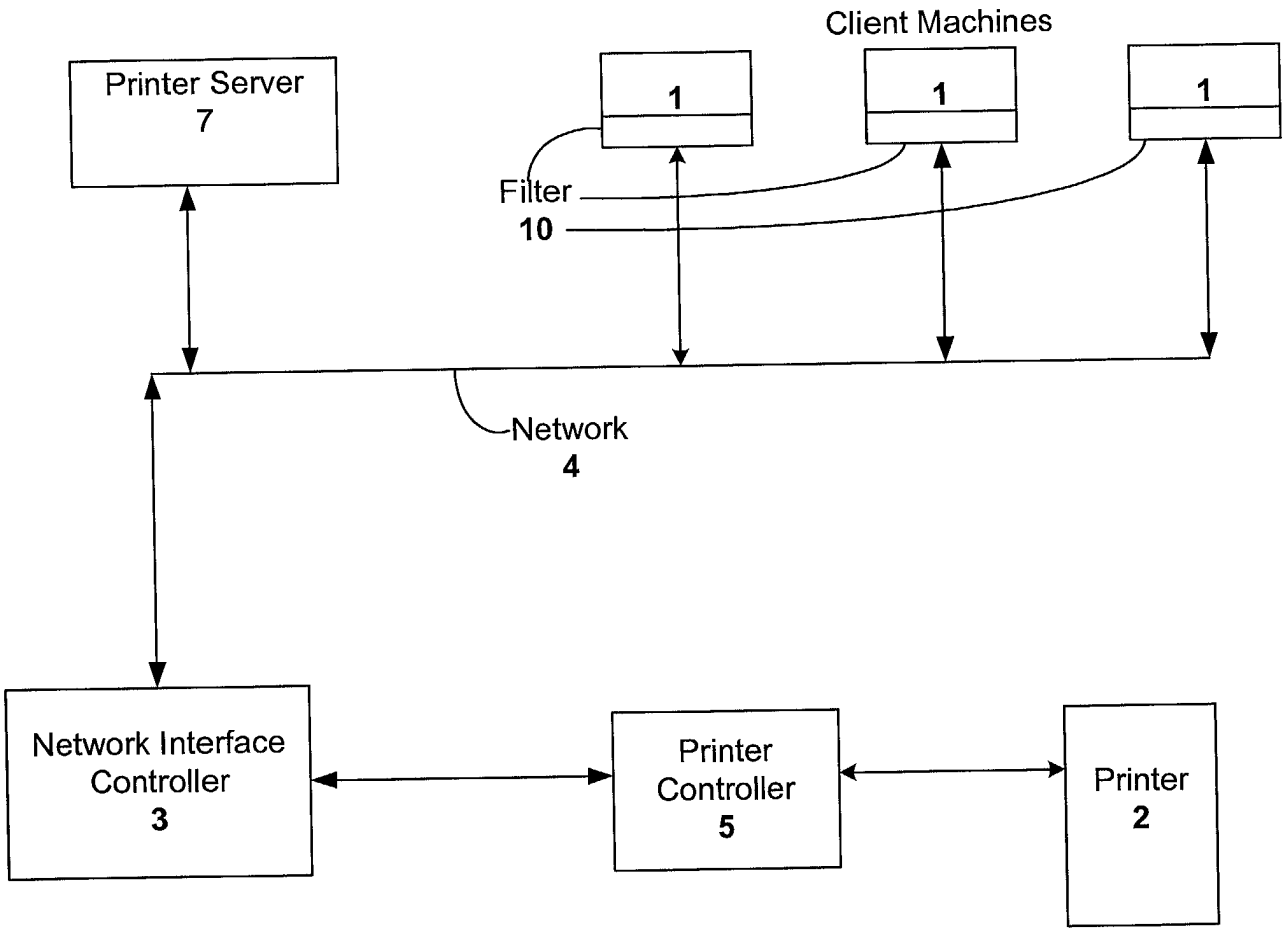
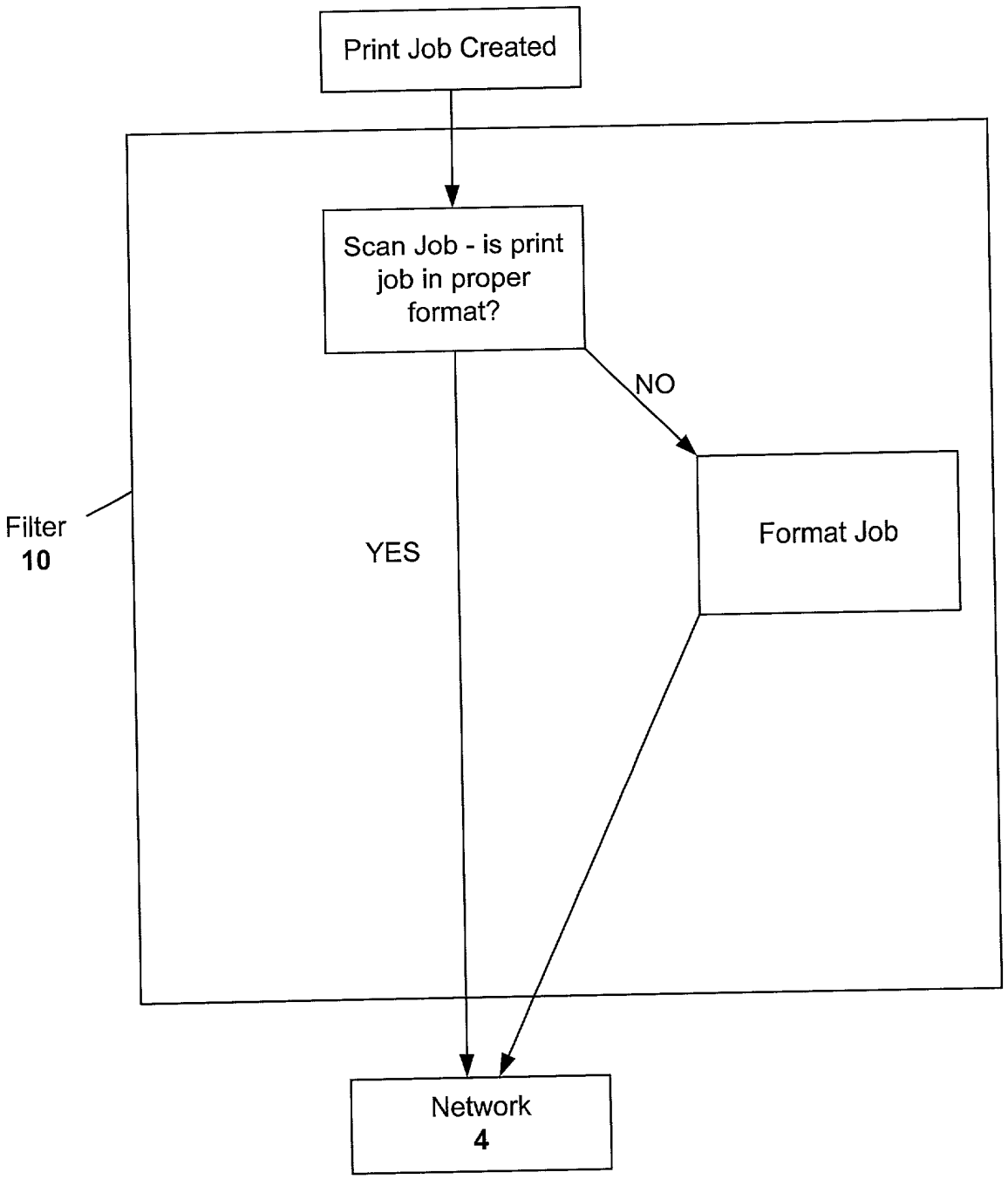

Client Machines
Printer Server
7
1
1
1
Filter
10
Network
4
Network Interface
Controller
3
Printer
Controller
5
Printer
2

FIG. 5


Print Job Created
Scan Job - is print job in proper format?
NO
YES
Format Job
Filter
10
Network
4

Docket No.
P5180/03226.050001

Declaration For Patent Application

English Language Declaration

22511

PATENT TRADEMARK OFFICE

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

IMPROVED METHOD AND APPARATUS FOR NETWORK PRINTING

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International Application Number _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	☐
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	☐
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, CFR Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor
Pankaj KHANDELWAL

Sole or first inventor's signature
Khandelwal
Date
08/23/2000

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Full name of second inventor, if any

Second inventor's signature
Date

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Full name of third inventor, if any

Third inventor's signature
Date

Residence

Citizenship

Post Office Address

Full name of fourth inventor, if any

Fourth inventor's signature
Date

Residence

Citizenship

Post Office Address